

**REMARKS**

Applicants thank the Examiner for the very thorough consideration given the present application. Claims 1 and 3-20 are now pending in this application. Claim 2 has been cancelled. No new matter has been added by way of the present amendment. Claim 1 has been amended to incorporate the limitations of previously presented claim 2. Newly added claim 7 is supported by the Specification at page 7, lines 8-9. Newly added claims 8-12 find support at page 7, lines 13-21. Claims 13 and 14 are supported by the Specification at page 9, lines 17-27. Similarly, newly added claims 15 and 16 find support at page 10, lines 23-31. Claims 17 and 20 are supported by the Specification at page 12, lines 12-20, whereas claims 18 and 19 find support at page 13, lines 26-30. Accordingly, no new matter has been added.

In view of the amendments and remarks herein, Applicants respectfully request that the Examiner withdraw all outstanding rejections and allow the currently pending claims.

**Election/Restrictions**

The Examiner set forth a restriction requirement with respect to claims 1-6 during a telephone conversation on November 30, 2006. A provisional election was made with traverse to prosecute the invention of Group I, claims 1-2 and 5-6. Applicants hereby affirm this election.

Applicants respectfully request rejoinder of the "method of making" claims (non-elected claims 3-4) once allowable subject matter is established for the ion exchange membrane of claim 1 and dependent claims thereof (MPEP §821.04).

**Issues Under 35 U.S.C. § 102(b)**

Claims 1, 5 and 6 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Fenton et al. (U.S. 6,456,136) (hereinafter Fenton '136). This rejection is respectfully traversed.

The Examiner asserts that Fenton '136 discloses a composite membrane structure comprising a porous polymeric matrix and a protective layer disposed adjacent to the porous polymeric matrix. The Examiner appears to assert that the porous polymeric layer is equivalent to Applicants' "porous film layer", and the protective layer is equivalent to Applicants' "surface layer". The Examiner further asserts that the porous polymeric layer has a pore diameter of 0.025 $\mu$ m to about 1 $\mu$ m. Furthermore, the Examiner asserts that the protective layer comprises a binder, an ionically conductive solid, and a hygroscopic powder.

It is respectfully submitted that the Examiner has failed to establish a *prima facie* case of anticipation. For anticipation under 35 U.S.C. § 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present.

As presently amended, claim 1 is directed to an ion exchange membrane comprising a porous film and a surface layer, wherein the pores of the porous film are filled with an ion exchange resin and the surface layer comprises an ion exchange resin and a **lamellar particle having an aspect ratio of 50 to 2,000** (emphasis added). As acknowledged by the Examiner (see the outstanding Office Action at page 5, line 19), Fenton '136 does not disclose the use of a lamellar particle having an aspect ratio of 50 to 2,000.

Clearly, Fenton '136 fails to explicitly or implicitly teach each and every aspect of the claimed invention. Accordingly, this rejection is improper.

Reconsideration and withdrawal of this rejection are thus respectfully requested.

Issues Under 35 U.S.C. § 103(a)

Claim 2 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fenton '136. This rejection is respectfully traversed.

It is initially noted that claim 2 has been cancelled by way of the present amendment. The limitations of claim 2 have been incorporated into claim 1. The following remarks are directed to claim 1, as amended, and dependent claims thereof.

The Examiner asserts that Fenton et al. discloses most of the limitations of this claim, but “does not explicitly teach fine powders having an aspect ratio of 50 to 2000”. The Examiner further asserts that the invention would have been obvious to one skilled in the art because the claimed aspect ratio would not result in a patentably distinct device.

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings of the references to obtain the invention. Second, there must be a reasonable expectation of success in making the invention. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

As discussed above, Fenton '136 fails to teach or suggest an ion exchange membrane comprising a porous film and a surface layer, wherein the pores of the porous film are filled with an ion exchange resin and the surface layer comprises an ion exchange resin and a **lamellar particle having an aspect ratio of 50 to 2,000** (emphasis added).

Applicants have discovered that the use of a lamellar particle having an aspect ratio of 50 to 2,000 results in an ion exchange membrane having excellent methanol impermeability. When the ion exchange membrane according to the present invention is used as a diaphragm for a direct methanol type fuel cell, improved impermeability is obtained. In contrast, when a conventional ion exchange membrane (having high methanol permeability) is used as a diaphragm for a fuel cell, it is impossible to completely prevent methanol in the fuel chamber from being diffused into the oxidizing agent chamber and it is difficult to obtain high outputs from the cell (see Applicants' Specification at page 2, lines 21-30 and page 9, lines 21-27).

For purposes of illustration and not limitation, the Examiner's attention is directed to Examples 1-7 (Applicants' Specification at pages 26-30). Particles A, B and C having an aspect ratio of 200 to 1000 are used in Examples 1 to 6, whereas particle D having an aspect ratio of 1 is used in Example 8 (see Table 1 on page 28). The methanol permeability is  $0.55 \text{ to } 0.65 \times 10^3 \text{ g} \cdot \text{m}^{-2} \cdot 24 \text{ hr}^{-1} \cdot \text{atom}^{-1}$  in Examples 1 to 6 whereas it is  $0.85 \times 10^3 \text{ g} \cdot \text{m}^{-2} \cdot 24 \text{ hr}^{-1} \cdot \text{atom}^{-1}$  in Example 7. The methanol permeability in Example 7 is about 1.3 to 1.5 times higher than that in Examples 1 to 6.

As evidenced in these examples, the ion exchange membrane of the present invention greatly improves methanol fuel efficiency when lamellar particles having an aspect ratio of 50 to 2000 are used as compared to membranes where ordinary particles (aspect ratio of about 1) are

used. Clearly, Applicants' inventive ion exchange membrane performs significantly different than prior art membranes and provides a methanol type fuel cell having increased output.

Evidently, the cited reference fails to teach or suggest every limitation of the instant invention. Accordingly, this rejection is improper.

Reconsideration and withdrawal of this rejection are respectfully requested.

### Conclusion


All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and objections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Marc S. Weiner, Reg. No. 32,181 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

By 

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